Discrimination of Surface Lithologies on Eastern Melville Island, Canadian High Arctic: Ongoing Investigations Involving TM and Hyperion Datasets

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A key focus in arctic and sub-arctic remote sensing involves the refinement of methodologies for identification and differentiation of surface lithological classes. Difficulties related to lithological discrimination in northern regions are related in part to subtle differences in the spectral properties of certain rock classes, as well as complicating factors such as spatial variation in the mineralogical, vegetative, and weathering attributes of rock units and associated earth materials. Investigations of classification algorithms and digital imagery are being conducted for a study region on eastern Melville Island, Canadian High Arctic. Materials exposed at the surface of this region are mainly late-Paleozoic clastic and carbonate sequences of the Sverdrup Basin. Also exposed in the study area are Ordovician and Silurian carbonates of the shelf province of the Franklinian Mobile Belt, and Cretaceous gabbro dikes. Weathered and frost-shattered felsenmeer, in the form of fine sand to coarse rubble, is the most common surficial material in the study area. The vegetative cover of most of the study area is sparse, and consists mainly of Saxifraga oppositifolia barrens. Research to date suggests that Landsat-TM-based classifications of surface materials may best be generated for the region using a majority-vote consensus neural-network classifier, which combines the classification results of multiple feedforward backpropagation neural networks. The scope of the present investigation builds on this work, and has been expanded to involve the utilization of Hyperion hyperspectral imagery through the employment of both classification and mixture-modelling strategies.